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THESIS

MODIFIED BENCHMARKING STUDY OF PROGRAM MANAGEMENT WITHIN A MATRIX STRUCTURE

by

Robin S. Fuller

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Principal Advisor: Linda Wargo

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This thesis sought to identify several organizations representing both the government and commercial industry that were successful in implementing program management within a matrix structure to isolate best-practices that lead to superior performance. Research data were gathered from current and former program managers from these organizations. These managers were queried about their experiences with the matrix structure: the matrix implementation process, benefits, pitfalls, and lessons learned. The research findings were significantly parallel to issues identified in existing literature. The analysis revealed that the while the matrix structure is highly effective in increasing project integration and customer responsiveness, it is beset by slow decision-making and the effects on organizational culture, such as fear and uncertainty about the furture. Comparatively, the advantages of the structure win over the disadvantages. However, while the drawbacks identified by the informants were classified as annoyances as oppose to major hindrances, these managers felt they were challenged to overcome them each day.

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Robin S. Fuller
Lieutenant, United States Navy
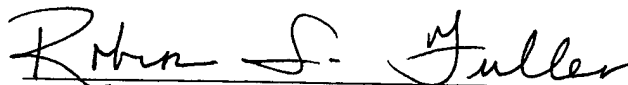B.S., Savannah State College, 1991

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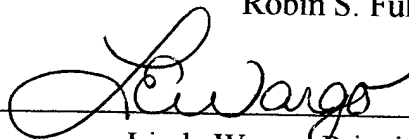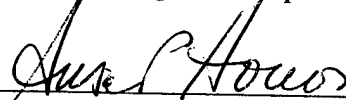from the

NAVAL POSTGRADUATE SCHOOL
March 1996

Author: _____

Robin S. Fuller

Approved by: _____

Linda Wargo, Principal Advisor

_____

Susan Hocevar, Associate Advisor

_____

Reuben T. Harris, Chairman
Department of Systems Management

ABSTRACT

This thesis sought to identify several organizations representing both the government and commercial industry that were successful in implementing program management within a matrix structure to isolate best-practices that lead to superior performance. Research data were gathered from current and former program managers from these organizations. These managers were queried about their experiences with the matrix structure: the matrix implementation process, benefits, pitfalls, and lessons learned. The research findings were significantly parallel to issues identified in existing literature. The analysis revealed that the while the matrix structure is highly effective in increasing project integration and customer responsiveness, it is beset by slow decision-making and the effects on organizational culture, such as fear and uncertainty about the future. Comparatively, the advantages of the structure win over the disadvantages. However, while the drawbacks identified by the informants were classified as annoyances as oppose to major hindrances, these managers felt they were challenged to overcome them each day.

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I. INTRODUCTION

The Military Sealift Command was chosen as the subject of this research study for several reasons. One main reason is that MSC is a prototypical organization seeking to implement program management within a matrix structure and can benefit significantly from this type of research. Secondly, they were amenable therefore, background information was easily accessible. Finally, MSC was selected because they are the sponsor of this research.

A.   BACKGROUND

The primary means of transporting enormous quantities of materiel in peacetime or in war is via the ocean. Sealift is essential to executing the nation's forward defense strategy and ensuring success in transporting needed supplies, people, and equipment to the theater during a conflict. In 1970 the Military Sealift Command (MSC) became the single managing agency for Department of Defense (DoD) ocean transportation for all government agencies. Later in 1988, MSC became a component command of the United States Transportation Command (USTRANSCOM), which is responsible for providing global, common-user sea, air, and land transportation for national security objectives. MSC's primary mission is to provide ocean transportation of equipment, supplies and ammunition to sustain U.S. forces worldwide during peacetime and in war. The other two USTRANSCOM components, the Air Mobility Command and the Military Traffic Management Command, provide airlift and management of the overland lift system, respectively. (MSC, 1993)

MSC, headquartered in Washington D.C., employs more than 8,000 people worldwide. There are area commands in New Jersey, California, England and Japan, and subarea commands in Virginia, Guam and, Italy. In peacetime MSC

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operates approximately 125 ships with 3,600 civil servants and 2,000 contracted mariners in three different forces: (1) the Naval Fleet Auxiliary Force (NFAF), which provides direct support for Navy combatant ships; (2) the Special Mission Support Force, which carries out a variety of highly specialized missions, such as oceanographic research; and (3) the Strategic Sealift Force, the largest force of the three, which sustains U.S. military forces. Transitioning from peacetime to war requires an expansion of sealift and personnel levels to full mobilization, where sealift forces increase to more than 1,400 ships and personnel requirements increase to over 46,000 people. (MSC, 1993)

Sudden or gradual, change is the only constant in any organization. The Military Sealift Command is no exception. MSC's re-invention decision was driven by Congressional and Executive requirements, new competition, and customer demand. The Desert Storm operation revealed shortfalls in the military's mobility capabilities consequently, in 1992 Congress mandated a Mobility Requirements Study. The study called for improvements in mobility forces and readiness, such that the Pentagon could indeed handle two major regional contingencies simultaneously. (Kitfield, 1995) Shortly thereafter, Vice President Al Gore released the 1993 National Performance Review (NPR), an ambitious reform initiative to change the culture of the federal government. There was to be a new focus on efficiency and customer satisfaction. NPR would also force some government agencies and departments to justify their existence. Numerous government entities would be faced with the possibility of elimination, consolidation, or even privatization as a result of the bipartisan interest to rid the federal government of unnecessary bureaucracy and excessive spending. (Shoop, 1995)

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During a short time span serious issues surfaced for MSC. Congress'
Mobility Requirement Study and Vice President Gore's NPR would require MSC
to build up its capability, but with fewer resources. The prospect of private
organizations providing strategic sealift services would also be a growing concern
for MSC decision makers. MSC's top managers began to rethink the normal
operating methods of the complex organization as their customers became more
demanding, resources became more scarce and the competitive outlook became
more intense. Confronted with reduced maintenance budgets for the Ready
Reserve Force (RRF), drastic cutbacks in the shipbuilding, and new readiness
requirements MSC would have to develop an effective response to the rapidly
changing environment. (Kitfield, 1995)

In February 1995, the Commander of the Military Sealift Command and a
group of senior leaders would identify a need for change and subsequently commit
to an organizational structure change that entailed adopting a "Program
Management" form "along business lines" within a matrix structure. The new
structure would involve cross-functional program teams, lead by program
managers (PMs), combining efforts to more effectively and efficiently meet
customer requirements. See *Exhibit 1.1,* for a chart of MSC's reinvented
organizational structure. The Military Sealift Command had traditionally operated
under a hierarchical "Functional" organizational form patterned after the "JOINT"
commands' structures. But now top managers would face designing, implement-
ing, and evaluating a complex restructuring that would yield a leaner, more
efficient organization. See *Exhibit 1.2,* for a chart of MSC's Current Organiza-
tional Structure. As set forth in the February 1995 MSC Reinvention meeting the
desired end-state of the reinvention effort would allow the organization to (1)
facilitate customer focus and feedback, (2) provide clear communication channels

for stakeholders and customers, (3) capitalize on its core competencies, and (4) operate more efficiently in an environment of tight budgetary constraint. Looking outward at high performing organizations that have successfully implemented a program management matrix-type structure, there are some expected successes and obstacles that lay in the future for MSC as they transition from a Functional to a Matrix organization.

B.   OBJECTIVES

This thesis has the following objectives:

1.   To provide background information on the various strengths and weaknesses of program management structures in both government and private industry, by conducting interviews with managers already operating under a matrix structure.

2.   To provide foresight into the implementation phase of MSC's reinvention effort, by examining other program management practitioners' success stories and applying their "best practices" to the MSC effort where applicable.

3.   To disclose obstacles and pitfalls related to the implementation of a matrix structure that may hinder the success of the reinvention effort, while providing MSC managers with insight into controlling the structure in the future.

C.   RESEARCH QUESTIONS

1.   Primary Research Question

What are the possible methods or organizational variants that can be used to optimize the success of the newly proposed program management organizational structure within the Military Sealift Command?

2.   Subsidiary Research Questions

a.   What are the primary advantages and disadvantages to using the Program Management structure?

b.   Who has the program management "best practices"; what are these practices and how are they measured?

c.   How did other organizations successfully implement program management; what were some pitfalls and lessons learned?

d.   What should MSC expect in terms of implementation of the new structure? What can they now do to ensure success?

D.   SCOPE

The scope of this thesis is to provide relevant and useful information and analysis that may facilitate and optimize the structural change at the Military Sealift Command.

This research will focus on: (1) the advantages and disadvantages of the Program Management (PM) organizational structure, (2) program management implementation "best practices," (3) problems associated with the implementation phase, and finally (4) lessons learned from successful PM practitioners as they relate to the Military Sealift Command's proposed new organizational structure. This thesis investigates the (successful) Program Management structures of several commercial and government organizations, determines some "best practices" and obstacles encountered, and projects the "best practices" onto MSC's proposed organizational change. It is not the intent of the researcher to generate new empirical data or to develop a specific model to test the data.

E.   LIMITATIONS

This research effort began as a plan to conduct a full benchmarking study of implementation strategies for MSC's organizational change effort. During the preliminary literature searches, it was determined that a full benchmarking study would require more resources than had been previously thought. Specifically, time was needed to develop relationships with partners so that information flowed

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freely. Monies and time were needed to conduct numerous site visits. Numerous talented people were needed to manage the various components of the study. Finally, it was also found that benchmarking is not a one-time effort. It is used very much in the same way as Total Quality Leadership (TQL) -- in that it is a continuous quality improvement method. (Camp, 1989) A Full benchmarking study would not be feasible within the constraint of a student thesis. However, benchmarking is recommended as an approach to be used by MSC personnel as a continuous improvement tactic.

F.   METHODOLOGY

The methodology for this thesis entailed both telephone interviews with current and former program management practitioners, who have intimate knowledge of PM structures in both government and private industry, and a comprehensive open literature search. The literature was provided by academia, government organizations, commercial organizations, and NPS consultants. The search was not exhaustive, but did provide an adequate sampling and cross-section of the available information on the topics of program management within the matrix structure, benchmarking /"best practices," complex change efforts, and MSC background.

G.   ORGANIZATION OF THE THESIS

The thesis is divided into five chapters. The chapters are organized as follows. Chapter I briefly introduces the organization and the problem. It also outlines the research objectives, lists research questions, and describes the organizational plan of the thesis.

Chapter II evaluates and interprets existing work. This chapter defines and introduces the reader to the concept of Program Management within a Matrix structure, by reviewing its evolution. It also addresses the "who" and "how" aspect

of the structure, and finally it thoroughly reviews the pros and cons of the Matrix-type structures.

Chapter III provides greater detail on the methodology and procedures used to collect and analyze data. It describes the design and the nature of the investigation, discusses the sources of research information, and outlines the limitations of the research strategy.

Chapter IV presents, summarizes and analyzes the results of the modified benchmarking study. Data gathered from both the site visit and the telephone interviews are presented and analyzed here as a means of exposing managers at MSC to the practical issues of program managers in successful matrix organizations. This chapter will assist MSC's newly appointed program managers in smoothly transitioning their organization from a tradition hierarchical structure to one that is decentralized and customer-focused. Also, this chapter identifies matrix management implementation best-practices and exposes significant obstacles, based on data gathered in both the literature review and the benchmarking study, thus addressing the research questions posed in Chapter I.

Chapter V is a summary of the thesis. It reviews the major points of the research project and summarizes the best-practices identified in earlier chapters. Lastly, related areas of possible research are identified.
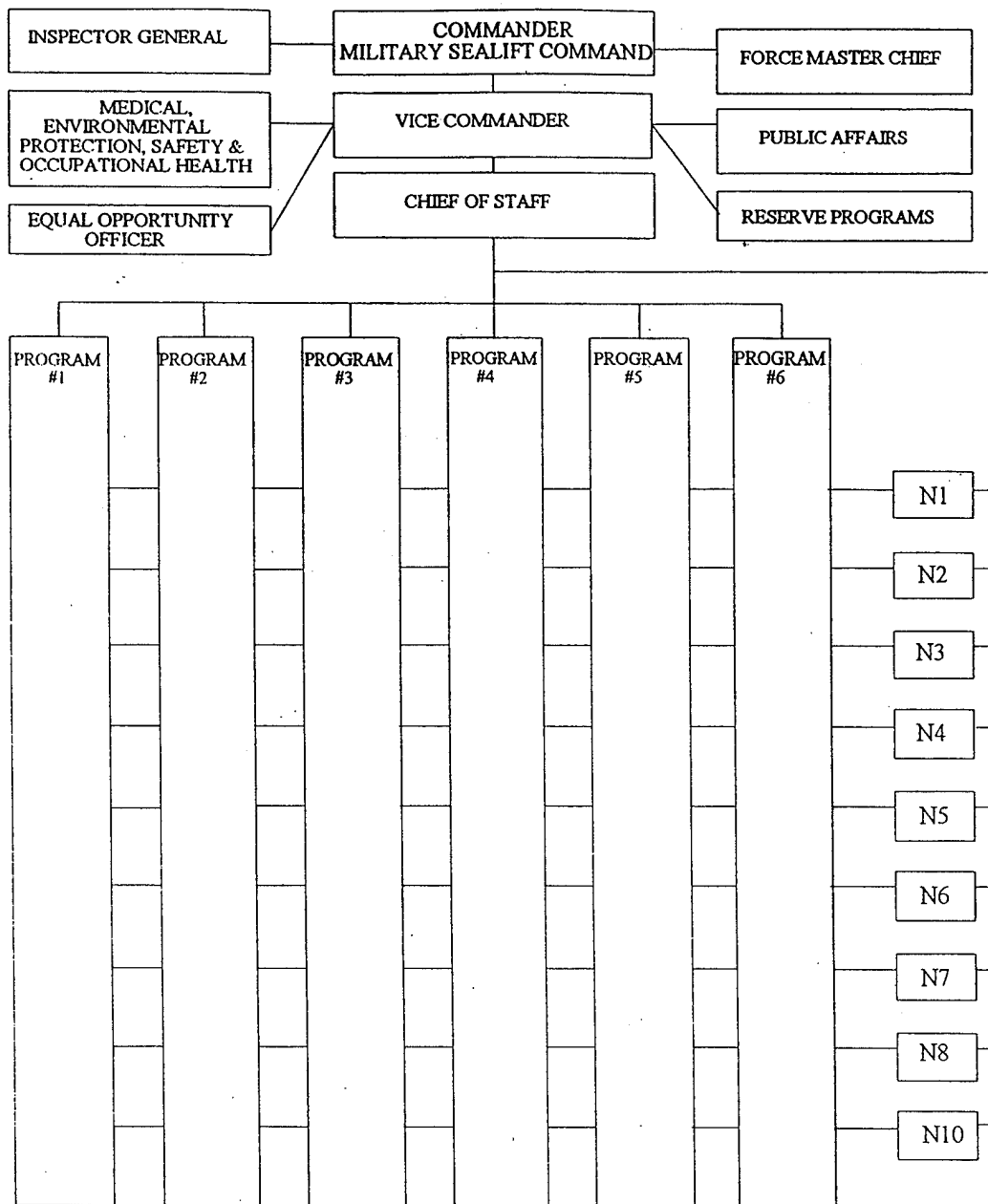
Exhibit 1.1. MSC's Reinvented Organizational Structure (Rutledge, 1995, p. 24)
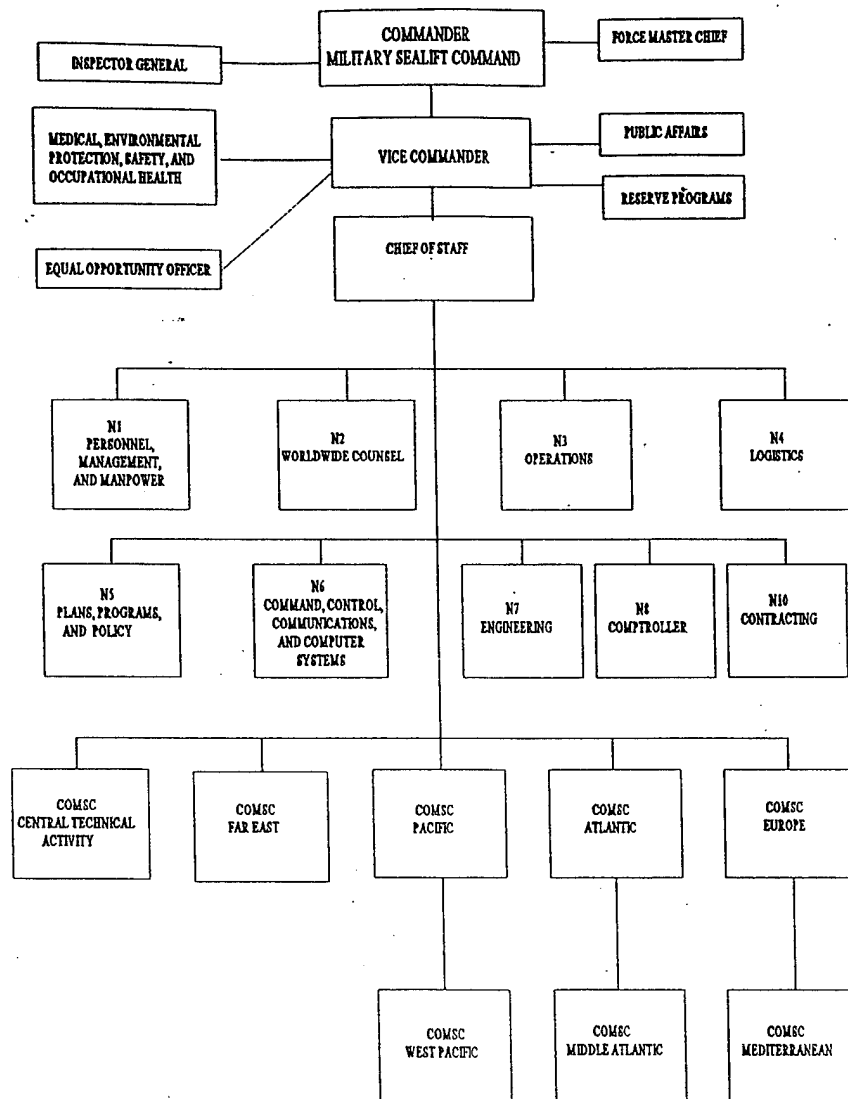
Exhibit 1.2. MSC's Current Organizational Structure (Rutledge, 1995, p. 19)

II. LITERATURE REVIEW

A.   ORGANIZATIONAL STRUCTURES

This section reviews the literature and focuses on commonalities that exist with the topics of functional, project and matrix management. It identifies advantages and disadvantages of these organizational forms, and emphasizes the characteristics of effective matrix structures. The review is not exhaustive; the literature devoted to these topics is quite extensive.

There is no such thing as a "good" or "bad" structure, only an "appropriate" one -- appropriate for the overall strategy and culture of the organization. Organizational structure is simply a tool or vehicle used in accomplishing the business of the organization, hence organizational structure should promote the organization's strategic initiatives. Management is seldom given the opportunity to design a flawless structure from scratch, consequently they attempt to modify an existing system that is either insufficient for meeting the company's current challenges, or altogether obsolete. Until the emergence of the matrix form of organization, traditional management theory only offered two choices for organizing the business operations of a firm: (1) a company could organize functionally, whereby single-function units operate all of the company's work in a particular area or discipline, or; (2) it could divisionalize by forming project groups to assume total responsibility for the completion of individual projects. To aid in fully understanding the complex characteristics of the matrix form, the functional and project structures will be introduced first. (Janger, 1979)

1.   Functional Organization Structure

A functional organization is defined as one in which specialists are segregated into distinct groups based on their discipline (i.e., marketers are

grouped in a marketing department, while engineers and accountants are grouped in engineering and accounting departments, respectively). This structure is characterized by a vertical hierarchy with direct-line reporting to progressively higher levels of management. It generally works well for organizations with routine technology and ongoing operations requiring only limited interdependencies of various functional skills. (Gilbreath, 1986)

The functional structure can provide several benefits to the organization. One example is that it enables individuals to stay abreast of technological advances in their respective fields, and to achieve higher levels of professional training and development by allowing the core functional employees to concentrate their efforts and interactions solely in their functional areas of interest. The primary value of this structure though is the gain of economies-to-scale through the use of centralized skilled workers. Core functional employees often work on several different projects simultaneously and spend little or no time idle, waiting for the pace of a particular project to pick-up. Other benefits of the functional structure include the consistency of training for its personnel, and the inter-changeability of those employees from one project to the next. (Ford and Randolph, 1992)

Employing the functional structure also introduces a variety of costs to the organization. Major among these is the difficulty created in coordinating across the distinct functional disciplines, task orientations, and organizational localities. (Ford and Randolph, 1992) Regardless of the size or scope of the project, the functional organization is not structurally altered; no overall project responsibility is assigned, and there is no reorganization or redirection of resources. Projects are simply divided into segments and assigned to the relevant functional areas. In doing so, it is assumed that the whole is the sum of the parts. This structure promotes focus on completing individual tasks rather than achieving project goals.

For this particular reason, functional management is most unsuited for project work, such as ship construction. The limitations of a functional structure spurred the creation of the project organizational structure form, which permits project objectives to be at the heart of all activities. (Gilbreath, 1986)

2.   Project Organization Structure

The "project island," as author Robert Gilbreath (1986) calls it, was a response to the failure of the functional organization to effectively deal with large, complex organizations which have multiple products. The project structure can be described as one in which a combination of human and non-human resources are pulled together and completely detached from the rest of the organization to form temporary, multi-disciplinary teams for the sole purpose of completing a single project or program. Within this structure, project managers have full responsibility over projects from start to finish, and they are given the authority to acquire the necessary resources without relying on the good will of functional managers. While there is typically some reporting to the hierarchy by the project manager, most project-relevant decisions are made within the teams. (Gilbreath, 1986)

This structure is typically preferred by companies that are embarking on new developments and one-time, unique endeavors. In such cases, the project structure can reduce or even eliminate the difficulties of resource coordination, by concentrating everyone's attention strictly on the requirements of a particular product or service. (Ford and Randolph, 1992) Other advantages attributed to this type of system are improved business effectiveness, and better responsiveness to the organization's markets and customers. (Gilbreath, 1986)

The benefits of adopting a project structure do not come cheap, however. First, the cost of obtaining separate core resources for each project can be high, and economies can be lost due to the fact that there is little sharing of expert

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knowledge between projects. Personnel issues may also emerge as a counter-productive force resulting from the isolation brought on by this structure. By totally divorcing the project team from the rest of the organization, the team members may be inclined to form a confrontational stance -- an "us against them" mentality. Conversely, due to the transitory nature of projects and uncertainties about the futures of project members after project completion, allegiances to both the project and the project manager can often be weak and temporary. Team members' morale is affected because they know the projects will not go on indefinitely. (Gilbreath, 1986) Also, potential contributors to the isolated project may be driven away by the requirement for total commitment, and because the total concentration of effort on one project can hinder their ability to stay current with developments in their own functional expertise, possibly resulting in technical obsolescence. (Ford and Randolph, 1992)

Clearly, a project structure addresses some of the shortcomings identified in the functional structure, but it also sacrifices many benefits of the functional structure. Many organizations found that they needed to continue pursuing an organizational form that would minimize or eliminate the trade-offs involved in choosing one over the other.

3. Matrix Organization Structure

The matrix approach did not emerge all at once, instead it evolved due to the shortcomings of both the functional and project structures. Government and commercial organizations such as aerospace firms, defense contractors, and construction companies that engaged in project work continued to search for a more appropriate organizational format. (Janger, 1979) This eventually resulted in development of the matrix organization.

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The matrix organization tries to gain the advantages of both the functional and the project organizations by providing project-driven goals and coordination, while maintaining a linkage with the functional expertise. From the project world the matrix gains improved market and customer responsiveness. From the functional world, the matrix inherits higher levels of technical consistency through each project, and transfer functionally-based knowledge from one project to the next. (Gilbreath, 1986)

a.   *Matrix Organizational Structure Defined*

Matrix exists in various forms across a wide range of organizations, including engineering and aerospace firms, R&D organizations, manufacturing organizations, marketing firms, financial service firms, international organizations, health care providers, and Management Information Systems (MIS) organizations. Different companies and different industries use a variety of nomenclatures to refer to the structure. "Matrix management, project management, matrix organization, are frequently interchanged. All of these terms refer to some type of cross functional organization because they invariably involve bringing people together from two or more usually separated organizational functional areas to undertake a task on either a temporary bases or a relatively permanent basis." (Ford and Randolph, 1992)

The variety of terms and forms make it difficult to find consensus on a single, precise definition of a matrix organization. In their book, Matrix, Stanley Davis and Paul Lawrence (1977, p. 87) define it as a traditional, vertical hierarchy overlaid by some form of lateral authority that creates multiple lines of authority and that places people in teams to work on tasks for finite periods of time. Further, the matrix is a coordinative structural device which "constructively blends the program orientation of project staffs with the specialty orientation of functional

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personnel in a new synergistic relationship." (Ford and Randolph, 1992, p. 268) Within the matrix structure, companies are able to simultaneously pursue multiple business dimensions, with each dimension being given equal priority. (Janger, 1979) *Exhibit 2.1* is a schematic chart of the matrix organization.

b.   Matrix Types

A continuum of matrix types lies between the purely functional and purely project forms that identify the primary source of matrix decision authority. According to Larson and Gobeli (1987), three different forms of matrix structure can be identified: the functional matrix, the balanced matrix and the project matrix. Under a functional matrix, the project manager relies on personal influence and communication skills to coordinate the functional areas of the project. Here, the project manager acts in the capacity of a staff assistant and has only indirect authority to monitor the project. The functional managers are the one who are responsible for the design and completion of technical requirements within the discipline. In the balanced matrix the project manager defines what will be accomplished by establishing project plans, integrating functional contributions, setting schedules and monitoring progress. Functional managers determine how project tasks will be accomplished through the assignment of personnel and the execution of functional requirements according to the project manager's directions. Under the project matrix, the project manager has primary control over personnel and work flow activities, while functional managers are limited to providing services and advisory support.

c.   How the Matrix Structure Works

In the matrix organization primary operational responsibilities are divided between two types of managers, the program manager is responsible for all product line activities, while the functional manager is responsible for the manage-

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ment of human and material resources, thus providing functional support across product lines. The structure is largely built around a cooperative relationship between the two types of managers. Subordinates within the matrix typically report to, and take direction from both managers creating a dual reporting system. With both managers sharing the responsibility for product quality and expertise development, they plan and control their activities jointly. Resource managers control resources, but lack the authority to determine when, how and on what their resources will be used. Program managers have authority to specify work. The two matrix managers report to a common supervisor, who acts in the capacity of a judicial figure in the resolution of disputes. This common supervisor is able to hear arguments from the parties, make a decision and continue the business of the organization. In a basic sense, it is this individual's task to keep the matrix moving. (Janger, 1979)

d. *Who Is Suited for the Matrix Structure?*

Matrix structures can be found in very large organizations with multiple products or services that have related operations such that they can share functional resources. The premise is that more is to be gained by combining resources than by keeping them separate. Therefore, matrix formats are desirable when there is a need to manage several products or services, market segments, skill segments, and knowledge bases in a balanced way. Matrix management also works well for complex organizations that must respond to environmental and technological turbulence by modifying their product or service frequently. In such situations, it is imperative that companies are able to deal with substantial levels of information processing made necessary by uncertainty and interdependent issues that arise both outside and inside the company. Companies must be capable of processing this information so that balanced decisions can be made among

product, geographic, functional and other interests for the good of the entire corporation. (Kramer, 1994)

Companies in various industries have myriad reasons for adopting the matrix structure. Typically, they have had problems making traditional organizational approaches work for them. They often point to changes in the character and complexity of the business environment and the company culture. (Janger, 1979) The rationale for choosing the matrix structure rises out of two broad categories of analysis: "externalities", issues outside the organization, and; "internalities", or issues inside the organization. According to Kramer (1994) some external issues include (1) regional economic integration; each day more companies have to concern themselves with geographic factors and how they can become an important part of the changing global marketplace, (2) business drivers such as technology, specialized skills, customers , and key competitors in conjunction with the slow rate of economic growth. A few internalities to be considered include: (1) information technology systems within the organization, and (2) the need to find ways to integrate across the company's product, geographic and functional activities in order to achieve a primary goal of customer satisfaction. (Kramer, 1994)

e.   *Advantages and Disadvantages of the Matrix Structure*

Matrix management works most effectively in organizations willing to adopt working norms of decentralization and lowest level decision making, regardless of formal structures. The challenge to any company embracing matrix management, is to transform the prevailing attitude within the organization from one of separation to one of collaboration. The matrix managers' and team members' willingness to collaborate and to do whatever it takes to achieve

company goals, including departing from organizational policy or creating new policy, is critical for a smooth transition. (Kur, 1982)

The matrix structure is not a panacea for all organizational ills. Further, no single form of matrix management is suitable for every firm. Individual organizational success pivots on the ability of management to capitalize on the advantages while simultaneously minimizing the negative aspects of this structure.

(1) **Advantages**. Numerous advantages have been attributed to the matrix organizational structure by various experts in the field of organizational theory. Most of the advantages are derived from the creation of horizontal communication linkages. While the favorable characteristics of this management format vary slightly from one expert to the next, the recurrence of certain themes seems to signify a general consensus on several key issues. In order to sequence the following discussion, the various advantages will be categorized based on the following general descriptions: (1) flexibility; (2) market responsiveness; (3) project integration; (4) economies-to-scale, and: (5) information flow.

<u>**Flexibility**</u>: Perhaps the most commonly identified advantage of the matrix form of management is that it offers flexibility to the organization. It is credited with the ability to bring multiple expertise to bear on a problem to resolve it in a manner that enhances the entire business. By offering individuals the opportunity to work on a variety of projects with others from a variety of areas within the organization, a matrix has potential to influence motivation, job satisfaction, individual commitment, and personal development. In sharing ideas, knowledge, and perspectives, a matrix enlarges an individual's experience and outlook, increases responsibility and involvement in decision

making, and offers a greater opportunity to display capabilities and skills. (Ford and Randolph, 1992) This interaction between disciplines encourages technical consistency from one expert to another. These consistent technical skills among people along with the ability to find solutions to complex technical problems allow the matrix team to be highly interchangeable, flexible, and assignable to many different types of projects. (Kramer, 1994)

Market Responsiveness: The second recurring theme is that the matrix structure enhances an organization's ability to respond rapidly and positively to the markets that it serves. As an example, C. Edward Kur (1982) points out that in a business with a product focus, changes in consumer demand can be rapidly responded to within the product group, because all the needed resources of functional specialists are available immediately.

Project Integration: The achievement of high levels of project integration is another often-touted result of the effective implementation of a matrix. According to author Robert D. Gilbreath (1986, p. 74), "the matrix attempts to break down artificial organizational barriers, use skills directly where needed, focus on product over process, and put simply, to get things done despite the organization." In a sense, the implementation of the matrix forces the consideration of all important business factors due to the interaction of key managers having product, geographic, or functional responsibility. (Kramer, 1994) The matrix is credited with fostering more direct coordination of efforts, both vertically and horizontally within the organization: vertically, the project leader can better coordinate the functional resources, while horizontally, the functional manager can coordinate and direct all functional expertise across the product lines. (Kur, 1982)

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Economies-to-Scale: Another advantage of the matrix form of organization is the opportunity to gain economies-to-scale and more effective cost management. It can allow an organization to leverage its core technologies, and provide an opportunity for global economies by optimizing the use of resources. (Kramer, 1994) Ford and Randolph (1992) credit the multidisciplinary approach to projects under matrix management with providing this particular benefit. This is because the multidisciplinary approach allows the project to benefit from the use of functional economies and cost savings achieved through interchangeability and full utilization of skilled employees, while remaining sufficiently small and task oriented enough to stay technically innovative.

Information Flow: A final broad category of advantage offered by the implementation of a matrix structure within an organization involves improvements in the internal flow of information. To this end, some communication channels become more formalized (mainly lateral channels), and informal means of communication are legitimized (managers are able to capitalize upon influence and negotiation skills as never before). Improvements to lateral communication include the creation of channels that are unavailable in traditional bureaucratic structures. This creation of new channels is caused by the imposition of communication among different departments and projects as managers are forced to maintain close contact with the organizational groups whose support they must rely upon consistently. Here, the development of communication skills can be viewed as a politically intelligent response by managers attempting to retain the support of their resource providers. In contrast to the expansion of lateral channels vertical communication is reduced due to the greater reliance on team-based decision making.. In addition to the creation and improvement of information channels by the matrix structure, the organization's information volume-handling

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and processing speed capacities are enhanced over more traditional structures. This can be attributed to the increased contact among departments that allows information to permeate the organization more rapidly. (Ford and Randolph, 1992)

(2) **Disadvantages.** The matrix organizational structure is not without its down side. Most of the disadvantages spring from the creation of dual or multiple authority and influence. The disadvantages of the matrix format seem to be clustered around a few key themes. These disadvantages will be placed into five broad categories to aid in their discussion. These categories are: (1) power struggles and heightened conflict; (2) excessive overhead and higher costs; (3) dual reporting and ambiguity in authority; (4) slow reaction time due to the emphasis on consultation, and; (5) effects on organizational culture.

Power Struggles and Heightened Conflict: The most common authority conflicts are those between functional and project managers over project priorities, administrative procedures, technical perfection versus performance trade-offs, personnel resources, cost estimates, and personalities. In particular for the functional managers, a large source of conflict is insecurity and an erosion of autonomy. These factors often cause them to view a matrix as a loss of status, authority, and control over their traditional domain, possibly resulting in resistance and hostility towards the matrix. On the individual level , a great deal of conflict can arise from the increased interaction of people with different work orientations, professional affiliations, time horizons and value systems. (Ford and Randolph, 1992) All conflicts are intensified by the development of disputes about credit and blame and the tendency to hold one individual responsible for success or failure. (Kramer, 1994) The possibility also exists that conflicts may be intentionally fueled by those who see it as an opportunity for

personal gain. Such individuals or groups will tend to play one side of the matrix against the other, by emphasizing the idea of divided loyalties that is characteristic of the matrix structure. (Gilbreath, 1986)

Higher Overhead Cost: Implementation and operation of the matrix can be costly to the organization. The implementation process can become quite expensive as start-up costs balloon, and heavy expenses incur as the result of high travel, meeting and training costs. (Kramer, 1994) The existence of dual authority creates the need for additional staff and management overhead, and an aspect of "organizational heaviness" can set in due to excessive consultations that delay decision making. (Ford and Randolph, 1992) Still more costs are associated with unused or underused resources, additional training requirements for project and matrix managers, and the requirements of monitoring, controlling and coordinating people and projects within the matrix. (Ford and Randolph, 1992)

Dual Reporting and Authority Ambiguity: To a large degree, disadvantages are the products of the dual or multiple overlay of authority and influence. In traditional structures, two basic hierarchical rules apply: (1) authority should equal responsibility, and; (2) every subordinate should be assigned to a single boss. A matrix violates both of these principles. Boundaries of authority and responsibility as well as subordinates themselves are split or shared between functional and project managers, creating ambiguity and conflict over areas such as resources, technical issues, salaries and promotions, and personnel assignments. Often, this erupts into a power struggle as each side attempts to clarify and define its responsibility and accountability. (Ford and Randolph, 1992) In the case of such power struggles, the potential exists for disputes to end in gridlock and arrest project progress if the opposing parties take

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up intractable positions. The problems spill over to team members as their loyalties are divided, and inconsistencies arise from the temporary nature of assignments, and key work elements (i.e., reporting procedures, documentation requirements, reports and records) that may vary from manager to manager, and from one project to the next. (Gilbreath, 1986) Power struggles especially manifest themselves during performance appraisal time. Employee evaluation is a constant point of contention and confusion for all stakeholders within a matrix -- who should do the evaluation, and who should have input to the evaluation are the questions on everyone's mind.

Slow Reaction Time: Another disadvantage of the matrix structure that is closely related to the previous one is the delay in organizational reactions. To a great extent, this slowed response capability is caused by the emphasis on meetings that consume large amounts of management time, committee activities, and the solicitation of input from numerous groups and individuals. In his observations of organizations using the matrix format, Robert Kramer (1994) noted that issues not only took longer to resolve, but that the final resolutions were often settled "in terms of the least common denominator acceptable to both sides." He also noted that planning activities were often held captive by "gamesmanship and unending debate."

Effects on Organizational Culture: Finally, the employment of the matrix structure has cultural implications for the organization that must be taken into account. It often creates difficulties in the integration of new employees into the system. These individuals may need to be provided with higher levels of orientation, training, and re-socialization. C. Edward Kur (1982) noted that the characteristics and requirements of matrix systems tend to violate many established norms of traditional management in western society. In

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particular, managers must possess higher levels of interpersonal and political skill than normal (in traditional settings) to operate successfully under the matrix structure.

B.   BENCHMARKING

1.   What Benchmarking is and What It is not

The pioneer of the technique, Xerox's Robert Camp, defines benchmarking as "the search for industry best practices that lead to superior performance." (Watson, 1992, p. 5) A broader, and perhaps more useful definition describes it as "a systematic and rigorous examination of the organization's product, service or work processes measured against those of the organizations recognized as the best, to produce changes and improvements in one's enterprise." (Ettorre, 1992, p. 10) This definition further emphasizes that "the most effective benchmarking is continuous, as the organization consistently seeks out feasible new areas to benchmark, eventually integrating benchmarking into strategic planning and corporate vision."

Benchmarking is a multi-purpose tool for overall continuous improvement, and an increasingly important component of a total quality system within an organization. Because of its flexibility, benchmarking can be used at the lowest level of the organization -- down to individual activities, or even individual products -- or to perform studies and comparisons across diverse industries. It is a means to perform careful, methodical introspection, motivate individuals or teams (by exposure to possibilities of excellence), identify weaknesses and the ways to correct them, lower costs, provide quantum improvements in operational and functional processes, determine a company's position within its industry, or even spot future industry trends.

While it is critical to understand what benchmarking is, it is just as important to understand what it is not. First, the process of benchmarking should not be confused with a benchmark. A benchmark is simply an achievement -- "a number that represents a measure of quality, response time, or some other performance indicator." (Sheridan, 1993, p. 32) Failure to make this distinction can lead to a misguided fixation on numbers alone. The general consensus among researchers in the field is that confusing the establishment of metrics with the deeper process of performing benchmarking operations is the most common, and the most damaging misconception among would-be benchmarkers. (DeToro, 1995; Ettorre, 1993; Grayson, 1994; Sheridan, 1993; Vasilash, 1994) Though benchmarking seeks to identify best-practices in other organizations that are suitable for internal adaptation, it is not simply a matter of copying the practices of others. In fact, it may not lead to adaptation of others' practices, but to a reinforcement and renewal of the organization's own practices. (Grayson, 1994) Benchmarking is none of the following: (Balm, 1993)

- one-size-fits-all tool, or process cookbook
- a one-shot activity
- a one-way flow of information
- a data base development project
- a simple competitive analysis
- a justification for wanton force reductions
- an excuse to conduct industrial espionage
- a cure for everything that ails the organization

2.   Why Benchmark?

The reasons for conducting benchmarking studies are numerous, so this discussion will highlight the more significant or unusual ones. One of the most

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basic, yet most important reasons is that if the organization's strategy includes becoming the best at some or all of what it does, then benchmarking is the only means of truly discovering when that goal has been reached. (Balm, 1992) Another basic, yet significant reason for benchmarking is that a company seeking to gain ISO-9000 certification or Baldridge Award recognition must be able to display concrete evidence of ongoing benchmarking activities as part of a total quality program. One of the most attractive reasons identified by many companies is the idea that benchmarking can provide not only incremental improvement, but quantum leaps in improvement. In fact, this is the reason that Xerox undertook the task of developing benchmarking techniques in the first place; the company perceived that it could not afford to wait on the pace of normal, incremental quality improvements and still remain competitive. (Tutcher, 1994) One quality expert, Joseph M. Juran, has termed this quantum improvement effect of benchmarking as the achievement of "stretch goals" (common among Baldridge Award winners). He describes stretch goals as "performance targets that cannot be attained by the pedestrian pace of the ordinary learning curve, but require an organization to significantly re-engineer the way they do business." (Zairi, 1995, p. 35)

There are many reasons that an organization might conduct benchmarking, not all of which are lofty in their aims. Some of the less positive motive extremes include: the organization being involved in a crisis situation or a struggle for existence; the need for good ideas to supplement those generated internally; a casual interest in finding out how the company stacks up against competition; the need for units within the organization to justify continued existence or impress top management; and the existence of idle time that needs to be filled. (Balm, 1992)

Finally, a fairly compact set of categories has been proposed by author Gary Beasley. He identifies five main (generic) reasons for pursuing bench-marking: changing or strengthening the company culture; increasing or gaining competitive advantage; creating awareness within the company by setting goals and the highest standards; enhancing operational performance by obtaining true productivity measurements; and managing the company strategically by spreading awareness of searching for best methods company-wide. (Beasley, 1995) See *Exhibit 2.2* for reasons for benchmarking and the contrasting results.

3. What Should be Benchmarked?

It is useful to note from the outset that the overwhelming consensus is that typical numerical measures (e.g., production rates, financial accounting measures, etc.) of achievement and improvement should not be the focus of any benchmarking study, whether internal or external. Instead, the focus must always be on the processes that are at the root of the numerical measures.

The American Productivity Center's "Benchmarking Management Guide" breaks down the list of items to benchmark into three succinct categories: (American Productivity and Quality Center, 1993, p.6)

- Business processes - the logical combinations of people, equipment, materials and methods that are organized into work activities to produce a given output. An example would be product distribution.

- Critical success factors (CSFs) - the characteristics, conditions, or variables that directly influence the customer's satisfaction with a specific business process, therefore affecting the success of the entire business (i.e., cost reduction, increased shareholder value and product quality leadership).

- Business practices - the methods or approaches that facilitate the execution of processes (e.g., utilizing Baldridge Award criteria as a yardstick to perform an internal assessment).

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4.   Who Should be Benchmarked?

The most obvious answer to the question of who should be benchmarked is, "the best." Less obvious, however, is the answer to the question of how does an organization identify and connect with the best benchmarking targets. Some general guidelines or suggestions for making this choice are presented here, as well as some things avoid.

The first instinct of most serious companies is to seek out winners of one of the major awards, such as the Baldridge Award. This is a sound strategy in general, but organizations must be aware of the fact that others are seeking the very same award winners. Such organizations are characterized as being generally amenable to helping others with benchmarking projects (some, like Xerox have groups devoted to handling inquiries), but they may be overburdened with requests. Some alternate suggestions for locating topnotch partners who are more likely to have the time to devote to helping with projects include: looking at the companies that the award winners studied; finding former winners that have been out of the spotlight for a while; studying companies that have excellence in some but not all areas (e.g., poor financial performers should not be overlooked); and seeking out lesser-known companies that have received some attention and recognition. Whatever the final choice of benchmarking partners, some experts caution against seeking out a partner that is overly similar to one's own firm. (Greengard, 1995)   There are also indirect methods of gaining useful information and identifying good benchmarking partners. One of these methods is to get information from the many professional and trade organizations that perform benchmarking research. Caution should be exercised, however, since many such organizations base their findings on one-time management surveys. (Blumberg, 1994) Also useful is for an organization to seek information on benchmarking

candidates from their own vendors and supplier base, since they have access to a wide range of companies and may be very familiar with their strengths and weaknesses. (Beasley, 1995)

5. What Does Benchmarking Cost?

The costs of benchmarking fall into the three basic categories of financial, talent and time costs. The first cost is the one that management usually narrowly focuses on when evaluating the value of conducting benchmarking. A study in 1995 by the American Productivity and Quality Center found that while the variation in dollar figures was wide (from a few thousand to hundreds of thousands), the typical organization spent between $40,000 and $50,000 on a single project. (Greengard, 1995) They proposed that organizations use the simple method of dividing their total annual benchmarking investment by the number of projects completed during the year to generate a figure for comparison purposes. (American Productivity and Quality Center, 1993) Financial costs do not simply end when the benchmarking team presents its findings, however, since there will be costs involved in implementing the improvements that are identified, possible coordination costs (especially in large organizations), and costs associated with the risk of inadvertent disclosure of confidential information. (Balm, 1992) The potential payback figures, however, indicate that a properly performed benchmarking project is well worth the financial outlay, with companies reporting result-to-cost ratios (from savings and improvements) as high as five-to-one. (Grayson, 1994)

The talent and time costs go hand-in-hand. First, since the successful implementation of a benchmarking program requires that the organization be willing to assign some of its first tier members to teams, other areas may suffer in their absence. The commitment to long-term payoffs must overcome the concern

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over short-term setbacks when considering the talent investment. This is especially true when the time requirements for effective projects are considered. Some estimates considered to be realistic recommend devoting 10 to 15% of team members' (six to eight members being optimum) time over a period of six to eight months for a well-planned project. (Sheridan, 1993) Another rule-of-thumb is that a team of about five individuals will spend one-third of their time over five months on a project. (DeToro, 1995) Generally accepted minimum and maximum time estimates are four and twelve months, respectively. (Sheridan, 1993)

6. How is Benchmarking Done?

One of the more straightforward approaches encountered in this research was a process consisting of the following five generalized steps: (1) preparing to benchmark, including such critical tasks as assembling the benchmarking team, and identifying and prioritizing a few specific activities in need of improvement; (2) conducting research to focus the collection and use of data; (3) selecting one or more benchmarking partners; (4) collecting and sharing information; and (5) analyzing findings, presenting results, adapting processes and implementing improvement projects. (Grayson, 1994) An important, final implicit step involves evaluating the project performance, resetting and repeating the process.

Benchmarking utilizes many various methodologies. None is necessarily identified as more effective that any other, and in truth they are usually employed in some combination, according to many factors including appropriateness and available budget. Typical methods used to conduct studies include telephone interviews, written interviews, literature and data base searches, and site visits. This study will employ a modified version of a benchmarking effort to identify best-practices within the matrix structure to assist MSC with its implementation process.
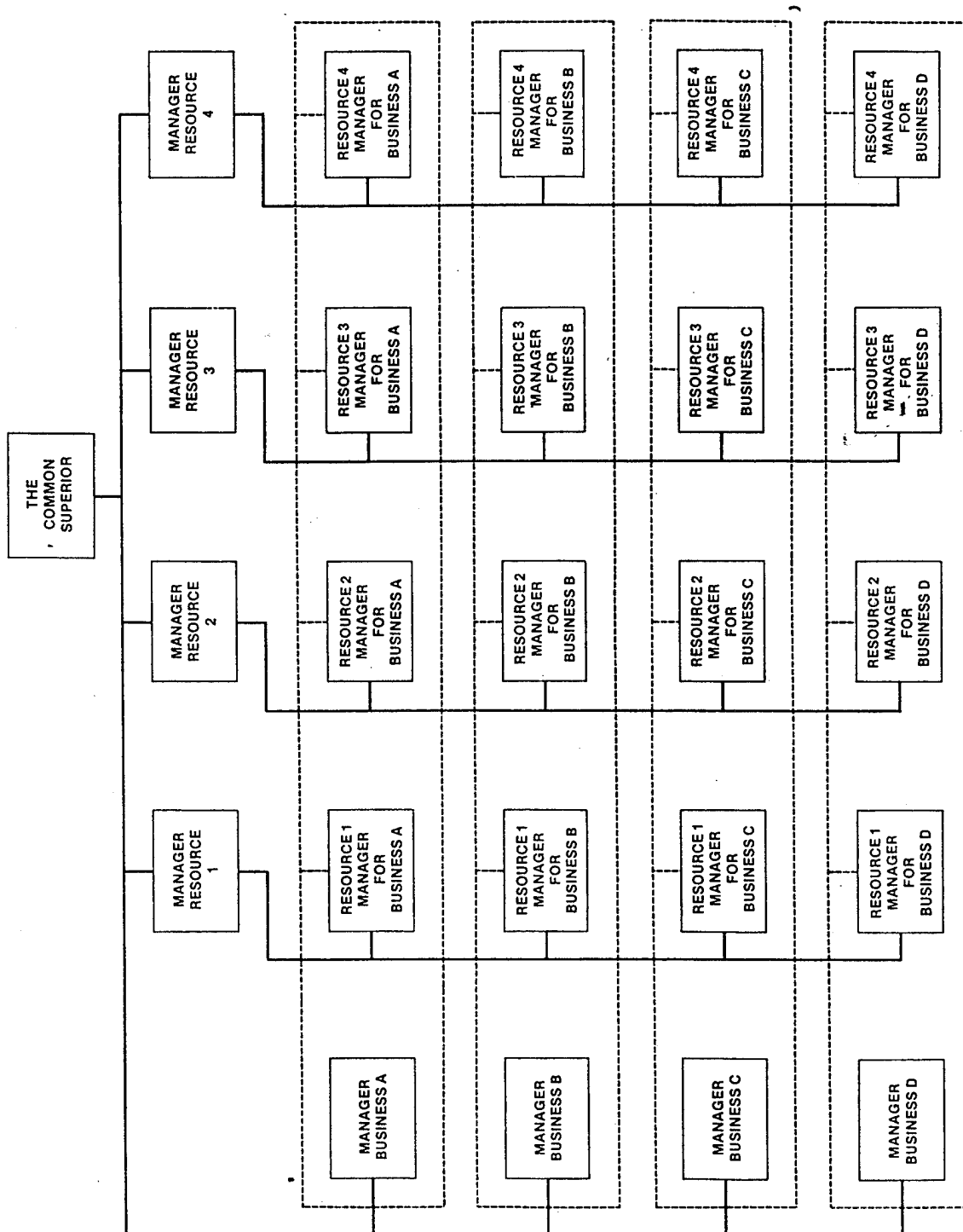
Exhibit 2.1. A Schematic Chart of the Matrix Organization (Janger, 1979, p. 18)

	WITHOUT BENCHMARKING	WITH BENCHMARKING

WITHOUT BENCHMARKING   **WITH BENCHMARKING**

Defining customer requirements

Based on history or gut feel	Market reality
Perception	Objective evaluation
Low fit	High conformance

Establishing effective goals and objectives

Lacking external focus	Credible, unarguable
Reactive	Proactive
Lagging industry	Industry leading

Developing true measures of productivity

Pursuing pet projects	Solving real problems
Strengths and weaknesses not understood	Understanding outputs
Route of least resistance	Based on best industry practices

Becoming competitive

Internally focused	Concrete understanding of competition
Evolutionary change	New ideas of proven practices and technology
Low commitment	High commitment

Industry best practices

Not invented here	Proactive search for change
Few solutions	Many options
Average of industry progress	Business practice breakthrough
Frantic catchup activity	Superior performance

Exhibit 2.2. Key Reasons for Benchmarking and Contrasting Results (Camp, 1989, p. 30)

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III. RESEARCH METHODOLOGY

A. OBJECTIVE OF THE RESEARCH

This thesis looks outward at national organizational leaders in the area of program management within a matrix structure, to identify best-practices that lead to superior performance. Informants in this study will be current and former program managers in organizations that have successfully implemented the matrix structure. Thus, another goal for this research is that it serves a useful tool for individuals in key positions at the Military Sealift Command. Its aim is to acquaint them with benchmarking as a quality tool, which will better enable them to minimize barriers to the successful implementation of the matrix structure.

B. GENERAL RESEARCH STRATEGY

A comprehensive open literature review and a modified benchmarking study consisting of telephone interviews and a site visit were used to achieve the above objectives. The data gathering process began with a public domain collection and concluded with an extensive field collection. The public domain information gathering began with a comprehensive library search enhanced by electronic database searches. It included books, periodicals, and electronic *key word* and *subject* searches. The researcher also pursued the assistance of professional associations and "company watchers" to help identify potential benchmarking partners to be used in the field review. A field study was conducted to gather rich best-practices data from the informants. The primary method used to collect this data was interviews. Six interview questions were used to collect current and historical information from each respondent that would give insight into their viewpoints and interpretations of the matrix structure. The researcher then sorted and categorized the responses for use in the analysis of the thesis.

C. CONDUCTING THE RESEARCH

The researcher originally planned to conduct a benchmarking study as described in Chapter II. Benchmarking is a very credible tool for establishing best-practices that lead to organizational prosperity, but it is quite expensive in terms of money, time and talent. This fact was the primary limiting factor in this research. Consequently, the researcher was forced to down-scale the bench-marking effort such that it fit within the constraints of a thesis, yet still was relevant and useful to key managers at MSC. In conducting this modified bench-marking study, the researcher employed the generalized approach previously discussed to the extent possible and reasonable. Modification of the procedure comes mainly by way of decreased depth. The steps for the modified bench-marking study were as follows:

- Selected modified-benchmarking partners
- Collected data
- Analyzed findings

1. Selecting Modified-Benchmarking Partners

a. *The Best Manufacturing Practices Program (BMP)*

Identifying the benchmarking sample for this study began with a telephone conversation with a Best Manufacturing Practices Program (BMP) contact. Before the discussion of steps taken to identify benchmarking partners continues, it is important that the BMP be introduced. The "Manufacturing" part of the title is somewhat misleading, because this organization's mission spans far wider than just identifying manufacturing organizations' best-practices.

Two key aspects of benchmarking are collecting and sharing information; these are the primary focus of the Office of Naval Research's Best

Manufacturing Practices Program. BMP is a national focal point for benchmarking, and since 1985 the program has identified the best-practices being used by world-class organizations, and encouraged both commercial industry and government to share information about these practices. Teams of independent government experts have been established to survey organizations that are willing to share information. Since BMP's inception, more than 75 organizations including McDonnell Douglas, NASA, and Naval Undersea Warfare Center Division have participated in sharing best-practices in areas of design, test, production, facilities, logistics and management.

The information shared in the surveys is benign and no one loses their competitive edge by participating. Also, the surveys are voluntary and at no cost to the participants. The reports that follow the surveys are distributed to organizations wishing to receive information to assist them in evaluating their own processes and practices by emulating the practices of organizations that excel in the area of interest. BMP is an outstanding, reliable and cost-effective resource for benchmarking and best-practices studies. The BMP saves time and money by identifying what the best-practices are, what benefits have been achieved, and who to contact free of charge to anyone wishing to use the service. This is a major benefit, since cost is a major consideration in benchmarking. Many smaller companies, financially constrained government entities, or thesis students do not have the needed resources to conduct the studies, training, or site visits typically associated with a benchmarking endeavor. Memberships in organizations such as The International Benchmarking Clearinghouse (IBC) or The Benchmarking Exchange (TBE) can exceed $18,000 depending on the size of the organization. Fortunately, thesis students, small companies with limited resources and large

organizations alike can benefit from the BMP services free of charge. (BMP, 1994)

b.   *How Subjects were Selected*

The Researcher petitioned the BMP contact to identify organizations that had been cited for having the best-practices in the areas of *program management, project management* and *matrix management*. The BMP representative was then asked to cross reference these organizations with those having best-practices associated with cross-functional teams. The original outcome was a list of twenty-seven organizations. The researcher then used the following criteria to reduce the twenty-seven down to the "finest of the fine": (1) did the description of the organization's use of program management align with the definition given by the literature, (2) was the "program management" practiced only associated with acquisition, (3) was the organization willing to participate in a thesis study, (4) were there representatives of both government and commercial organizations, and finally (5) what would be a manageable number of different organizations to study within the scope of a thesis. The organization descriptions published by BMP were used to eliminate thirteen organizations based on the first criterion. Of the remaining fourteen organizations, one other was eliminated because program management was only used to acquire major weapon systems. The last thirteen organizations were categorized by choice one and two, the former being the most preferred organizations (based on the most appropriate description of program management), and the latter being the second most preferred organizations. This outcome yielded seven "choice one" and six "choice two" organizations. Originally the researcher was to select only the choice one organizations for the study, but there was only one government representative among the group. So by

researcher determination, one choice two government organization was added to the selected sample for a total of eight organizations to be studied.

c.   *Participating Organizations*

The benchmarking partner sample used in this study ranged from well-seasoned matrix structures (fifteen to thirty years) to newly adopted ones (less than five years). Participants were small and large organizations with varying levels of operational complexity, with the common thread of all being involved in highly technical fields. Also, the matrix structures observed had varying decision authority ranging from that of a functional matrix to that of a project matrix (following Larson and Gobeli, 1987). This section will present a brief prologue on each organization that includes the name of the organization, the age and brief description of the matrix structure, and the purpose of the BMP citation.

NASA's Marshall Space Flight Center is a government aerospace organization that develops space transportation and propulsion systems. The agency adopted the matrix structure some thirty years ago. Generally, the center's missions are carried out jointly by project offices and industrial (functional) directorates with the support of numerous staff offices. The Best Manufacturing Practices Program commended this organization for its success in developing concepts and guidelines for using Product Development Teams (PDT) in the concurrent development of a specific product.

Naval Undersea Warfare Center Division (NUWC) provides support to the Department of Defense. This group instituted the widespread use of the matrix form nearly a decade ago. NUWC has two distinct groups of program managers, *internal* managers, who deal solely with internal customers, and *major programs* managers, who have the responsibility of coordinating external customer programs. For this research the interview questions were geared toward

responses from the *major programs* managers only. BMP praised this organization for the effectiveness of its environmental working groups. This success was credited to the performance of employees within a proficient matrix structure.

AT&T Federal Systems Advanced Technology represents the telecommunications industry and serves as a government contractor. Their interpretation of the matrix leans toward the use of Integrated Product Teams[1], which were instituted five years ago. This notable group received a citation from the BMP for its steadfast success in developing common program management processes, a program manager certification program, and tools that lead to company prosperity.

CONAX Florida Corporation is another contractor that supports the government in the life support equipment and aerospace arenas. Within this company Total Quality Management (TQM) is closely tied to the matrix structure, which was embraced in 1988. Streamlining production efforts through the use of integrated production teams won them praise from the BMP.

GTE Government Systems Corporation is a business that develops project-oriented government systems. This firm has operated under a matrix format since the 1960's. Its program managers have general manager (total profit and lost) responsibility. Their noteworthy work in program management information processes, standardized program management approaches, and customer communication information was recognized by the Best Manufacturing Practices Program.

Kaiser Electronics is a relatively small firm. Within this company program managers are the exclusive interface between customers and the program

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[1]Integrated Product Teams (IPT) is an initiative of Secretary of Defense, William Perry. The purpose of the IPT is to replace the sequential review process of a project in order to identify the need for modifications earlier in development.

itself (they draw technical support from the functional providers). This firm boldly incorporated matrix management in 1992. Subsequently, they were acknowledged for displaying skilled performance in developing a concurrent engineering[2] program through the establishment of IPTs.

McDonnell-Douglas Aerospace adopted the matrix structure company-wide seven years ago. This organization controls programs of such colossal proportions that corporate officers often serve as program managers. This outstanding organization was reported by BMP as having the best-practices in restructuring its organization by adopting a vertical "projectized" or project-oriented structure.

The final organization studied was Rockwell Autonetics Electronics Systems. A federal contractor, this corporation went to the matrix management structure with weak program manager authority five years ago. The structure has evolved since 1991 into a better balanced matrix operation, where the PM and the Integrated Requirements Team have more autonomy, accountability and authority to fully manage the program. BMP reports that this company successfully uses integrated teams for the control of major subsystems and service subcontractors.

d. People Interviewed

The ten people interviewed were representatives of their organizations' middle and upper management echelons. Eight of them were currently serving as program managers (in most cases on their second or third program), while two others were former program managers. In addition, four of the eight present and former program managers filled the functional manager position at

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[2]Concurrent Engineering is a systematic approach to the integrated, concurrent design of products and their related process, including manufacture and support.

present and former program managers filled the functional manager position at some point. As mentioned above, all of the organizations are involved in technical industries, therefore most of the program managers interviewed were engineers or scientists by profession.

2.   Collecting the Data

a.   *Interview Questions*

The benchmarking literature was used to determine the format of questions to be asked of benchmarking partners. The researcher then carefully reviewed and gained an understanding of both MSC's objectives and the characteristics of the matrix structure to form interview questions that would assist MSC in achieving its desired end-state via the path of least resistance. Interview questions were then developed that focused the respondents on the specific matrix topics needed for later discussion in the telephone interviews and the site visit. Care was taken in formulating clearly written, open-ended questions that were neutral, non-leading, and concise enough to ensure that understanding and interpretation were consistent. *See 3.1* for the list of interview questions.

From the BMP published citations, the researcher could ascertain that there were some varying opinions about the definition of program management. It became very important to ask each participating organization how they defined program management before the research could proceed. The benchmarking literature review suggested that metrics were a key component in interorganizational comparisons, so the subject of metrics was addressed in the interview questions. Finally, the primary reason for this study was to provide MSC with useful information from experienced program managers on implementing matrix structures, therefore it was imperative to ask each organization what

their experiences were, and what they learned from having gone through the implementation process.

b.   Conducting Interviews

Telephone interviews were used because they provided an opportunity to cover a wide cross section of respondents quickly and efficiently. Prior to any telephone conversations or visits, a short memorandum introducing the researcher and the thesis topic was faxed along with the interview questions to each informant. This allowed the individuals time to ask for clarifications, research and formulate precise answers to each question, and identify others in their organizations who could better respond to the questions if necessary.

The researcher utilized a telephone log to track the number of contacts needed to complete the interview. The result was an average of eight calls per organization, not including the interview itself. In arranging the interviews the researcher deferred to the schedules of the respondents to minimize the possibility of interruptions. Interviews were recorded and were each approximately fifty-five minutes in length. Most interviews were completed on the first attempt, but two were preempted by schedule changes. Once the telephone interviews were completed, four respondents needed to be contacted again for clarifications and additional information. At the conclusion of this research project, each organization will be contacted again to offer a summary of the thesis (many interviewees expressed an interest in a research summary).

Some individuals participating in this best-practices study expressed the desire for anonymity. Although each organization was introduced by name initially, all subsequent chapters will refer to the organizations and interviewees by alternate names to protect their privacy. Additionally, no specific comments or question responses are directly attributable to any particular organization.

c.   *Site Visits*

Due to fiscal constraints, only one site visit was conducted. The researcher selected the organization with the most information to offer, and the best ability to accommodate a thorough site visit, given the research time line. This opportunity was used to observe activities possibly overlooked in the telephone interviews, to get a better understanding of the true nature of the matrix structure. Observing methods and practices within a successful matrix structure firsthand gave the researcher better insight for effectively analyzing gathered data. The organization visited prepared a one and a half day schedule for the researcher. The first afternoon was spent getting acquainted with the host, the organization and the three groups (program, functional, and common management) that were to be interviewed the following day. The second day consisted of full day of interviews with matrix managers, matrix subordinates, and the common manager.

3.   Analyzing the Findings

The data recording procedures used for this research were note taking and tape recording. The researcher took extensive notes during the telephone interviews; the conversations were also recorded (with the permission of the interviewee) as backup. The researcher then used the taped interviews to fill in gaps in the written notes. Information gathered in the interviews was then carefully examined, and the top four themes within each organization were identified. The researcher then searched for common themes across the all eight organizations. This evaluation yielded the prevailing theme categories used in the research presentation and analysis portion of the thesis. The "best practices" and "lessons learned" referred to in subsequent chapters were drawn from these themes.

a.   *Determining "Best Practices" in this Research Effort*

The researcher made a determination of a "best practice" based on the following criteria:

1. The organization was cited by the BMP for having superior performance in areas related to the efficient use of cross-functional teams within a matrix structure.

2. The practice was discussed or alluded to in the literature review (this criterion was used because this thesis is not an empirical study, and because the sampling procedure limits the generalizability of the findings).

3. The practice had a consistently popular and positive response among interviewees.

Obstacles and lessons learned were determined in a similar manner.

D.   QUALITATIVE STUDIES

The data collection method used for this thesis can be classified as a qualitative study. A qualitative study is "an inquiry process of understanding a social or human problem, based on building a complex, holistic picture, formed with words, reporting detailed views of informants, and conducted in a natural setting." (Creswell, 1994, p. 73) The following is a list of common assumptions regarding qualitative studies:

- Takes place in a natural setting

- The researcher is the primary instrument for data collection

- Data from theses studies are descriptive (words)

- Focuses on the process that is occurring in addition to the product or outcome

- Data are interpreted in regard to particulars rather than generalizations

- Relies on intuition because the nuances of multiple realities can be better appreciated

- Researcher seeks believability based on coherence, insight and instrumental utility

- Researcher seeks trustworthiness through verification instead of validation and reliability measures (Creswell, 1994)

Using the interview as the primary method for collecting data generates the some positive and some negative impacts. Some advantages to using telephone interviews are:

- They serve the researcher well when informants cannot be observed.

- Questions are open-end and easily modified before and during the interviews.

- They provide good historical information and good understanding of the respondents' viewpoint.

Unfortunately though, .

- Interviews are relatively expensive (especially face-to-face).

- The biases of the interviewer and the informant have to be taken into consideration.

- There exists the possibility of non-comparable responses that are difficult for the researcher to interpret and analyze.

INTERVIEW QUESTIONS

1 **How do you define "Program Management within a Matrix structure"** in your own organization?

2 How did your organization go about implementing program/matrix management (sometimes referred to as Product Teams, Horizontal Teams, or Integrated Requirement Teams) as an organizational structure?

3 Critical Success Factors are the limited number of areas in which results, if they are satisfactory, will ensure successful competitive performance (examples of CSFs are meantime-between-failures or time-to-market). What are your CSFs for the matrix structure? How do you measure *output quality* and *progress in quality* improvements?

4 What are the primary advantages of the structure? What aspects of program/matrix management have given you the best return in performance improvements?

5 What are the primary disadvantages of the structure? What aspects of program/matrix management were the most difficult to implement in your organization? What pitfalls should be avoided?

6 What advice do you have for program managers of an organization in the early stages of implementing the matrix structure? What can be expected next? What practices should be duplicated to ensure success? If your organization could start over, what would you do differently? What would you do the same? What were the key lessons learned?

Exhibit 3.1. Interview Questions

IV. RESEARCH DATA PRESENTATION AND ANALYSIS

A. INTRODUCTION

The objective of this chapter is to present and analyze data collected from the representatives of eight matrix organizations. These organizations had been identified by the Best Manufacturing Practices Program as best-in-class for practices relating to program management and cross-functional teams within a matrix structure. Interview responses are presented, synopsized and thoroughly analyzed to assist readers in gaining insight into the matrix organizations and understanding the practical concerns of managers that are currently operating under this structure. The emphasis of the data presentation and analysis was the prevailing themes that emerged with some consistency from multiple respondents, rather than those that were specific to single organizations or peripheral to the research questions.

The format of the remainder of this chapter is as follows: the first three subsections of Section B represent interview questions that received limited responses from interviewees. The remaining sections are organized by themes and yield both the advantages and challenges represented by that aspect of matrix management.

B. INTERVIEW RESPONSES

1. Defining "Program Management"

There was not a consensus on a single definition for program management within a matrix structure. It seemed that each organization had taken the general form of the structure and adapted it to the specific needs of their organization. Consistent with the literature, each matrix structure described in the interviews involved overlaying a vertical hierarchy with a lateral authority, and placing

people in cross-functional teams. Although most organizations were already operating under the matrix structure, the researcher found that many structures were refined to resemble Secretary of Defense, William Perry's concurrent engineering initiative. Driven by downsizing of the federal government, the two government organizations and six federal contractors took the initiative to institute the use of integrated teams to ensure that the "hand-off" of a product from one functional component to another is smooth. These graceful hand-offs allow for quicker development time, fewer discrepancies and fewer reworks, which all lead to happier customers.

2. Implementation Strategy

Interviewees were unable to give precise details about how the matrix structure was implemented in their organizations. For some, the implementation process took place decades ago. The implementation strategy for these older structures seemed to evolve out of the need to respond to short term projects done in-house and under very tight budgetary constraints. Program managers from more mature matrix structures reported that there were few models for them to employ in the 1960s, so they were forced to rough their way through it, and simply document and learn from their mistakes. For some less mature structures, many program managers interviewed were working as engineers and scientist at the time, and did not play a significant role in the implementation strategy. They did recall some issues that surrounded implementing the matrix format, and were able to give some lessons-learned from their perspectives about teams, customers and organizational change.

3. Metrics for Critical Success Factors

Identifying true numerical measures for critical success factors was not possible for any of the organizations at the time of the interviews. Each expressed

that more effective ways to measure organizational success were "in the works," but not yet available. Perhaps, because all observed organizations were in highly technical industries, on the micro level output quality and progress in quality improvements were measured by discrepancy rates, rework percentages, and customer surveys. The most popular metrics for quality and progress on the macro level were cost, schedule and performance.

4. The Human Realm: Teams and Managers of the Matrix

a. Building Effective Teams and PMs Through Training

Building effective teams is a challenge to matrix structure success. Astoundingly, all the eight organizations responding to the interview questions had comments or concerns that dealt with the topic of training and skill development of matrix subordinates and managers. The research indicated that proper training early in the implementation process for both team members and leaders is fundamental to the success of this structure. The following is a typical comment concerning matrix employee training and skills:

> ...the most rudimentary factor in maintaining success is selecting the
> most competent people as PMs -- qualified people who can both
> guide the team and balance all other program factors simultaneously.
> Finding these multi-faceted talents and abilities is not left to chance.
> The word here is *training.*

The interviewee further explained that matrix organizations need to train their people more so than other structures, because good "people skills" as well as technical adeptness are essential to maintaining organizational effectiveness. While no informant complained of their employees lacking technical skills, most were concerned with these same employees acquiring interpersonal skills needed to be part of an integrated team. One respondent commented, "We attempt to train people for new expanded responsibilities until they become full-blown members of

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the team." There was also discussion about the abilities of up-and-coming program managers. Research indicated that program managers' skills are developed more so than taught. This was done by allowing would-be PMs to become generalists, so that they gain sufficient conceptual knowledge about the organizational goals to carry out the common mission, while focusing on a single program or project. Many organizations employed mentor/protégé' systems, whereas more senior PMs would mentor and share knowledge with program managers in training. As one interviewee commented,

> ...there is concern about the gap that lies between the low-end and high-end program manager skill pool. Consequently, a primary training initiative is to reconcile this disparity and smooth out the talent mix among potential program managers. Development of generalists or individuals that have expertise that span the company is key for matrix managers.

(1)   **Lessons Learned.** Interviewees learned that there are a myriad of ways in which to deal with building effective teams and developing competent program managers. The informants in this research project did so by carefully identifying the criteria of effective job performance for both groups. These criteria then became the basis for selecting the right people for the right positions. Among the list of criteria for matrix subordinates are: effective communication skills, and understanding how to manage conflicts and meetings. An interviewee commented,

> Program managers' ability to communicate skillfully with project teams has been a major factor in this company's prosperity. A competent program manager should be able to communicate adeptly on all levels with both customers and team members. There are some managers in the organization that are not as talented or well-trained as others; these people usually have profound difficulty leading teams.

On the same subject of program manager competencies another informant remarked,

> ... one of the most essential roles of the program manager is that of the marketeer. So selecting the 'right' person as program manager is the predominant consideration for attracting customers. At a minimum, the PM should be able to track and develop a thorough spending plan and communicate effectively both vertically (with superiors and subordinates) and horizontally (with peers). The PM must also know and understand the program technically, so that problems can be anticipated and corrected before they become 'show stoppers'.

Many organizations studied employed training courses of other flourishing matrix organizations, and sought out local universities offering educational courses to help employees function better within a matrix structure. Others brought in experts from outside to share information and experiences.

The program managers' job (more than any other in the structure) requires a unique mix of skills that vary based on the project itself. Among the required skills for a competent program manager are good negotiation, managerial, personal relations, and marketing skills (plus a touch of charisma). The best way many organizations found to achieve the desired talent mix is to bring individuals into the organization early (as matrix subordinates) and systematically groom them up through the ranks. The primary advice from the successful matrix manager to the matrix managers in organizations wishing to embrace the team approach is to take the time to do team building and team training during the initial launch of the new structure, and continue to do team building activities throughout the life of the team.

   (2) **Link to Literature.** The wide cross-section of books and periodicals used in the literature review, did not directly discuss team building

or program manager competencies, but alluded to them indirectly in the discussions of matrix flexibility and project integration. The literature identifies flexibility and integration as advantages of this structure, however it is implied that team cohesiveness (achieved through interpersonal skills training), and adept program managers are essential to ensure teams can solve complex problems and coordinate project efforts. Therefore, before either flexibility or project integration can be counted as benefits to the matrix format, the organization must build effective, well-trained teams and select capable program managers.

b. *Acquiring Resources Through Skillful Negotiation*

Without exception, interviewees agreed that obtaining the needed resources within matrix structures is challenging for program managers. Some illustrative comments about the difficulty of acquiring resources were:

> ...budgets are extremely tight and the functionalists are exceedingly strong and very protective of their people. These conditions make acquiring resources a major feat for the most experienced program manager.

> Getting prompt commitments from the functional components has undoubtedly been the most difficult aspect of matrix structure to control.

> Typical of the matrix structure, PMs cannot always get the staff they need when they need them; getting and shedding team members quickly can sometimes be a problem.

Research showed that the most effective means for meeting this challenge is the use of skilled persuasion between the two manager types. Interviewees described many scenarios (such as consensus on decisions, and competition for resources with other projects of equal priority) where negotiation and compromise were used to resolve issues. Examples of informant comments on the importance

of negotiation in a structure where power is spread evenly among many people follow:

> ...relationships between managers vary, but typically the PM and functional managers are coequals, so they compromise on issues concerning subordinates and the project to maintain the project progress and quality.

> Good negotiation keeps the balance between the functional directors' and program managers' authority and responsibility, because they are forced to concentrate on the common goal of program success.

> ...program managers have varying levels of responsibility and authority in the company based on the level of the program [i.e., one of the firm's major military projects is headed by the company's vice president]. However, the positional authority of the PM does not automatically grant him or her priority over resources; they must negotiate with functionalists for resources just as the other PMs do.

Negotiation works well because often functional managers and program managers are coequals. Also, many of the current program managers had at one time been functional managers, so there was a clear understanding of lines of authority and responsibility among most managers. This is not to say that power plays did not surface from time to time, but the interviewees said they are few and far between. It was also indicated that these conflicts are usually handled at the lowest level and seldom make it to the common manager level. Generally, the interview respondents perceived the duality problem (dual authority and reporting), characteristic of the matrix form, as somewhat inconsequential. However, the researcher did detect the surfacing of some negative feelings concerning functionalists from two of the program managers interviewed. They seemed to view functionalists as overprotective costly layers of management; their comments follow: One informant remarked, "Functional managers feel

disconnected from the real work of the organization, therefore they vie to hold on to what little power they have, by being overprotective of resources." Another commented, "Program managers often see functionalists as petitioners always looking to charge to some program. Functional management is a costly extra layer of management."

(1) **Lessons Learned**. According to interviewees, negotiation is effective in obtaining resources, but it needs to be enhanced by incentive and reward programs. Organizations that have established incentive programs report that functional managers respond to them very well. The incentive programs are usually in the form of financial awards and public recognition. Whenever teams are rewarded for being the best and most effective, functional core managers who fervently support the program should be included to share in the praise.

They also indicated that resolving power struggles and over-protectiveness of resources is done by way of top management clearly communicating the division of responsibility and authority for the various matrix managers during the implementation phase. Further, each time adjustments are made to structure, where there is a shift in power or responsibility, these new roles should be explicitly clarified and documents should be physically updated and distributed. Because there are so many different variations of the matrix form (project, balanced, and functional), all matrix employees need to know the bounds of their responsibility and power, to avoid the problem of the strongest personalities dominating decision processes.

(2) **Link to Literature.** Both the field review and the literature suggested that most power struggles occur between the two types of matrix managers. Research data supported the literature in that, the authority and

responsibility boundaries in a matrix create ambiguity over resources, which in turn causes conflict between functional and program managers. Finally, the high dependency on negotiation within the matrix organization displayed in the field study confirmed the increased use of informal means of communication among matrix managers addressed in the literature.

5. Quality Products and Good Customer Service

"There is an inherent ability to quickly modify the project direction with the PM's decisions, because the PM is the director of the program and is the direct interface for the customer." One respondent explained.

The study findings indicate that customers overwhelmingly favored the "single focus" associated with program management, and that it is the primary advantage of the matrix structure. They appreciated having a single individual to interface with on matters concerning a particular project. "We have found that customers respond favorably to having a single point of contact. Customers and program managers establish a rapport that is indispensable to the organization's success." Interviewees reported that their customer surveys strongly suggested that their customers approve of their adoption of the matrix structure primarily for this reason. Customer satisfaction is also closely tied to the price, quality and timeliness of the products. According to the quality measures used by responding organizations, costs and delays are kept down by fewer reworks and discrepancies during development, which also helped products be delivered on time. These benefits have been gained as a result of increased cross-functional coordination during the planning and development phases of the product. An interviewee claimed, "The matrix resulted in fewer reworks and better customer satisfaction. Customer surveys have been better over the past five years since the structure was adopted." Another interviewee confirmed the improvement in customer response,

"Since the adoption of the matrix structure, programs have significantly improved in affordability (improved quality, reduced rework, and reduced cycle time)."

(1)   **Lessons Learned.** Meeting or exceeding customer expectations must be a goal of both manager-types. Adopting matrix management brings with it the advantage of good single customer interfacing. As a marketeer, it is important that the program manager communicates well with customers, and translates their needs effectively to the technical experts. Interviewees agree that after marketeer, the program managers' secondary role is that of customer advocate as they continually focus on high quality and prompt delivery of products, within budget.

(2)   **Link to literature.** The research and the literature review both indicated that adopting the matrix structure allows the organizations to respond rapidly to customer requirements mainly because of the program manager role and the authority that accompanies it to pull and assign resources to a project effort. Also, the advocate and marketeer roles of the program manager identified in the research enhanced the discussion of customer / program manager relations in existing literature and gave a clearer picture of how the matrix structure actually accomplishes the high level of quality customer service it is famous for.

6.   Managing Change

The research findings showed change (e.g., change in responsibilities, reporting, and authority) was a challenging characteristic of all the matrix organizations. Though most organizational changes were subtle and incremental in nature (such as changing the performance reporting system to include input from both matrix managers instead of just the functional manager), others were large and non-routine, and altered the overall orientation of organization (e.g., changing from a centralized structure to a decentralized one). Resistance from

employees made changing from a functional to a matrix structure difficult for the participating organizations. Resistance appears in many forms and for many reasons. The major form of resistance cited by respondents was the reluctance of subordinates to perform new activities. Interviewees believed the main reasons for matrix employee resistance were distrust of top management and uncertainty about the future.

> There will always be some resistance especially from the functional people who feel thrown around from one project to another. This was the most difficult facet of the implementation process, because often this was the first time some people had total responsibility for a project.

In all cases the matrix structure was met with skepticism and doubt. Still another informant remarked on the level of effort required to overcome this,

> The culture change was the most difficult aspect of the shift. Trying to convince people this was the right way to go was exhausting. While more seasoned employees still yearned to be hardwired to a project, younger people adjusted quickly and loved the new structure almost immediately.

The introduction of the matrix form into some organizations left managers and subordinates fearful and doubtful about how to handle problems with projects under the new system. One organization said,

> When the matrix form was initially adopted team members were reluctant to 'open up' for fear of retribution if poor results were achieved. Vertical and horizontal communication were weak and decision-making was delayed, because managers would not report problems in their programs; they were unsure about how the matrix would handle problems, so they too feared retribution.

The new culture emphasized customer-focus and decentralized authority and decision making. Uncertainty about the future and the organizations' new culture

made it difficult for employees to accept the unfamiliar work environments and new value systems. One interviewee said,

> Changing the culture of the organization was the most difficult aspect of matrix management to carry out. People were not convinced it would work and be beneficial to them until they could see project success. There was a fear among top managers that people would view this as another product circle that may die some day.

The data further indicated that both existing employees being introduced to a new structure and new workers (previously from the functional world) joining an existing matrix structure experienced the same kind of anxiety and apprehension about the matrix structure. Also, respondents claimed that the structure that was implemented initially and the structure that exists today are not the same; they only share a resemblance. Because requirements changed, people rotated into and out of jobs, managers learned from mistakes, and more information was gained about the structure itself, incremental changes had to be made to adjust the structure to the environment.

(1) **Lessons Learned.** Informants indicated that top management demonstrated support, by supplying the necessary training, establishing realistic goals, and providing clear direction, increased the likelihood of an enthusiastic response to the new culture of decentralization. The interviewees recommended that organizations wishing to implement the matrix structure keep all stakeholders aware of changes (especially workers) and get their input whenever possible. Collecting periodic feedback from front-line personnel to modify the structure and keep it current and effective was also strongly encouraged. Program managers suggested that newly adopted matrix organizations maintain a historical database for making comparisons and take the time to log lessons learned as they happen and then pass them down to other rising

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program managers. They also pointed out that organizational history as well as more process-oriented metrics are important, because they are critical for making incremental improvements in the future.

(2) **Link to Literature.** Both research and literature concluded that any change effort as significant as adopting a new organizational structure is bound to have some cultural implications. However, the existing literature on matrix organizations did not expound much on the impact of changes to and within the organizational culture, and the researcher did not include a review of organizational change literature as part of this thesis. The field research went further to show that organizations continue to tweak and adjust the distribution of authority over the life of the matrix to achieve the "right fit." These moderate changes, unlike structure changes, are commonly met with enthusiasm and anticipation, because many of them are employee induced (changes made as a result of feedback from front-line personnel).

C. BEST PRACTICES

The ultimate aim of any benchmarking study is to identify best-practices in an area(s) of interest to the organization conducting the study. This modified benchmarking study has yielded several best practices that can be categorized as follows: the human realm, quality customer service, and change management. The following discussion will highlight methods that can useful in optimizing implementation success.

1. Best-Practices Within the Human Realm

a. *Integrated Teams*

All matrix operations revolve around the team, and working in teams is admittedly difficult at best, and completely ineffective at worst, according to research data. Employees have to see that teamwork is valuable to them, and that

they, as well as the organization, can benefit from it. Also, program managers and functional directorates must realize that building teams is time consuming work, but that the initial investment will be well worth the effort in the long run. Negative attitudes about teams and contention can, and do, arise from things such as meetings logistics, conflicting values, lack of support from upper management, and ambiguous reward systems.

The researcher discovered from the study that there is no single step to transform a disjointed group of people into a high performing team, but that there is an environment that is conducive to building effective, functional teams. That environment is one that has common vision, promotes creativity, and empowers its people; anything less may result in the team members feeling fearful, powerless, and ultimately defeated. If management wishes the cross-functional team to operate as a single, integrated unit, then the members should be trained as an intact group. The team needs instruction in such areas as decision making, conflict resolution, meeting management, interpersonal relations, problem solving, negotiating, customer service, and membership ground rules. Though team unity and autonomy are necessary, the team is not an island and cannot operate without the support of the rest of the organization. The prevailing opinion among informants was that the matrix structure requires a strong unified command at the top, a well-balanced relationship among middle managers, and a high level of integration on the front-line.

Teams have a responsibility to make some measurable contribution to the entire organization. If this can be accomplished better and faster by giving people a set of tools and generic instructions for dealing with human dynamics along with clear goals and performance standards, then this sort of education and training should be given as early and as thoroughly as possible. Managers and

team members alike must achieve the level of productive interchange where members can supplement as well complement each other. Although most agree that teamwork is a good idea theoretically, a comprehensive team-based incentive program would go a long way toward accelerating its acceptance and approval among employees of an organization committed to adopting the team approach. One organization developed a reward program called the "Eagle Award." It was a team-based incentive award system that included the functional managers that provided support to the winning project team. This organization periodically held ceremonies for disbursing these awards (silver eagles, golden eagles or cash awards) to the best and most effective teams. The interviewee from this organization said the awards were gaining popularity and that people were responding positively to the new system. Rewarding team performance and using teamwork as a promotion criterion institutionalizes the concept. Therefore, it is essential for the organization to consider incentive, reward and compensation issues early in the team formation process, because these types of systems can effect the feasibility of transitioning to a team design. It is also prudent to solicit feedback from the members to ensure the rewards offered truly stimulate and motivate them.

b.   *Conflict Management*

Matrix structures are characterized by decentralization, where there is no longer a single power base. Rather than being concentrated in leaders, power has been more broadly distributed among functional and program managers. The top managers derive control from their legitimate authority to bestow or withhold employee rewards. The functionalists' power is based on the expert knowledge they hold, while the program managers have the power of the purse. However, in

a matrix structure each must demonstrate the ability to charismatically influence others, because persuasion drives accomplishment of results.

Research data suggested that the adoption of a matrix structure that encourages the use of cross-functional teams, necessarily requires that both managers and team members develop their negotiation skills and establish good rapport with colleagues. Because bargaining, conflict resolution, and influencing opinions are better done face to face, effective interpersonal skills are imperative in a structure characterized by lowest level decision-making. Whether one views negotiation as conflict or as compromise, the prevailing attitude among research participants is that it is crucial to getting the job done within a matrix structure, because interpersonal relations arise out of the interdependence of work flows, information, and technical skills. Observations show that the mere exchange of information and the decision making process itself can often be confrontational, because the group, rather than a single individual, is the accountable unit. Ultimately, individual opinions and concerns must be reconciled to maintain team accord and to avoid unnecessary conflict.

Conflict should not threaten relationships that took time and diligence to build. It is important that team members move beyond the problem, and redirect their focus to the project and the customer. Conflict can be chronic, and can become severely embedded into a relationship, but open communication with intent to solve the problem can lessen its impact on the project. According to the research informants, no one can expect to win every issue every time in negotiations. Trade-offs should be made within the common goal by the opposing sides, and people at every level of the matrix structure must accept that a compromised decision is better than no decision at all. Confrontation, however, is not always negative, since disputes can rejuvenate and refocus a group on the

actual purpose of the debate (project excellence and customer satisfaction). To help members control hostility and minimize interruptions in project flow, teams can partake in activities that diminish anger and frustration. These activities can include everything from management coaching sessions to off-site retreats and sporting events. The goal of these sessions is for workers to be able to discover the root of their anger and learn to channel it more constructively (perhaps on a baseball field). The findings suggest that with proper conflict management skills employees can better avoid awkward predicaments in the future. If all resolution efforts fail, and the opposing parties cannot reach a decision, the common managers are there to act as arbitrators or even to break the deadlock if necessary.

c. Meetings and Consensus Decision-Making

The researcher discovered from the field study that meetings are an inevitable phenomenons in a team-based design. According to informants, meetings should be structured for the optimal level of effectiveness. To be effective, meetings must be regularly scheduled for maximum participation, they must be kept on track, participants must come prepared, and the meetings must end decisively whenever possible. In problem solving type meetings (more so than the information exchange type) management must take special care to select team members with complementary skills at comparable (expertise) levels within the skill mix to encourage good communication, reciprocal loyalty and mutual trust. From the members' viewpoint, they must participate in these gatherings in a balanced manner, ensuring that they do not dominate or succumb to their colleagues too frequently. Members are expected to sell their ideas logically and professionally, but also to relinquish a position and shift support to the team's decision over their own. Consensus-type decision-making is time consuming, but at the end every member must support the final decision.

d. *Economies-to-Scale*

Things are done faster when they are done in tandem rather than serially. The members' ability to manage themselves in collaboration with their teams, while efficiently apportioning their own time among projects or project subunits was a widely treasured attribute among matrix managers interviewed. Opinions were split, however, on the subject of gaining economies-to-scale from high interchange of core technologists serving on multiple project teams. While many managers expressed the desire to trade the economies for the security of having functionalists on hand and solely dedicated to one project, others in the group were convinced they were making the best possible use of their resources by maintaining a high degree of personnel rotation. While both schools of thought had valid points, with equal circumstances[3], co-location and fully dedicated teams better meet the matrix structure objectives of accountability, single-focus, cross-functional integration, high performing teams, and higher quality products.

2. Best-Practices for Quality Customer Service

Respondents reported that service quality improvement is a critical challenge facing organizations. It is fundamental to competition regardless of the markets targeted or the services offered. In the area of market responsiveness and quality customer service, the research findings are consistent with facts identified in the literature review. The surveyed organizations were unanimous in reporting improvements in either customer relations or service quality as a direct result of adopting the matrix structure. Although many organizations did not have statistical data to substantiate these claims, they were convinced that the matrix

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[3]The use of high rotations was usually a compromised decision resulting from conditions placed on the organization such as tight budgetary constraints and/or expanded responsibility.

structure was responsible for the overall improvement in organizational performance.

Without exception, interviewees agreed that customer satisfaction is truly the ultimate business strategy. Considering customers' needs in the design and management of the business has been promoted to "priority one" for most of the participating organizations. Evident in the comments of all respondents is the idea that their organizations have committed to creating a customer-focused climate. They have identified their customers' critical service attributes and have set their own critical success factors accordingly. They have realized that customer's levels of satisfaction vary from exasperation to elation, with "satisfaction" buried somewhere in the middle.

Mere customer satisfaction is the minimum acceptable response to stimulate repeat business. Leaders should set the organizational goals to exceed the needs of the customer as long as there is some marginal benefit in doing so. Interviewees found that higher service may translate to major investments in: training employees, upgrading equipment, surveying customers, conducting "best practices" studies, and providing more choices and better information. Improving service in the eyes of the customer is somewhat expensive, but the payoffs are vast and long term. Superior quality frequently means premium pricing, while continuous improvement usually equates to increased market share and loyal customers. Many reported that the company's bottom-line is directly impacted by the service provided to customers relative to the competition.

3. Best-Practices for Managing Change

When undergoing a major reinvention effort, people have to learn and unlearn processes, exchange power and status, trade old norms and values for new ones, and alter relationships with superiors and subordinates. Research showed

that these changes are difficult and often threatening, therefore, matrix subordinates initially resist transformations rather than accept or participate in them. In his book Managing Strategic Change Noel Tichy identifies five reasons for resistance to cultural change:

1. Resistance due to Selective Perception (cultural filters) - individuals' frames-of-reference prevent them from understanding important aspects of the change.

2. Resistance due to Values and Beliefs - the value system upon which the change is based may run counter of that of the prevailing culture.

3. Resistance due to Security by Regression to the Past - individual may revert to past cultural beliefs as a way of coping with a rapidly changing culture.

4. Resistance due to Conformity to Norms - pioneers of the change effort introduce new norms and a counterculture that often meet opposition from other organizational members.

5. Resistance due to Climate for Change - organizational members may resist change because they grade the following three factors low: (a) perceived need for change among organizational members, (b) the member's own perceptions about the organization's ability to change, and (c) the member's openness to change. (Tichy, 1983)

The interviewees did not explain the reasons for employee resistance in Tichy's terms (probably because they really did not know the true feelings of the average employee). The researcher did get the impression that resistance that surfaced in most of the organizations was probably due to selective perception, regression to the past, and climate for change. The data did suggest that the most effective means for defusing resistance to the change effort is maintaining consistent, open communication with all stakeholders, but equally important is allowing people sufficient time (without coercion and implied threats) to truly

accept the changes. Because human nature dictates that people strive for stability, employees, customers, stockholders, and even suppliers all want clear, relevant information on a real-time and regular basis. Uncertainty about one's future, especially where one's career and livelihood are concerned, undoubtedly disrupts this equilibrium. To work effectively, all parties must understand the aim, benefits, and requirements of the new culture. People must feel that they own and are part of the change *process* itself and not that they are just sideliners. Individuals need to know that they have a voice and a vehicle for expressing their concerns, posing inquiries, and contributing ideas. Research has shown that active participation can mean the difference between total commitment and mere compliance.[4]

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[4]Stephan A. Allen's "Organizational Choice and General Management Influence Networks in Divisionalized companies, " *Academy of Management Journal*, 21 (1978) gives evidence to this fact.

V. THESIS CONCLUSION

A.   OVERVIEW OF FINDINGS

Academicians' and practitioners' assertions about matrix management closely parallel one another. The key themes derived from both the literature review and the field review were consistent throughout. As an example, both sectors agree that the matrix works well for "projectized" organizations with complex operations requiring a high level of integration among functional components. They agree on many of the benefits, drawbacks, and needs of the structure as well. For instance, authors and managers agree that the structure is highly effective in increasing project integration and customer responsiveness, while it is simultaneously beset by slow decision-making and the negative effects resulting from individuals' fear and uncertainty about the future.

The interviewed managers' interpretations and attitudes surrounding matrix management were also similar. The general issues confronting managers of varying backgrounds are fundamentally the same, but their solutions differ. As an example, all interviewees agreed that adopting the matrix structure is indeed imperative for a project-oriented organization. However, while some strongly supported an immediate transfer to the newly adopted system, others felt the new structure should be tested on a smaller pilot group first. Interviewees were in agreement, though, that the true challenge to implementing and managing the matrix is maintaining the proper balance between the needs of the people (e.g. clear and relevant information and updates) and the mission of the organization.

Comparatively, the value of adopting the matrix organizational structure far outweighed any drawbacks associated with it, according to the eight organizations participating in this study. While there was certainly no shortage of matrix

pathologies arising from the conversations with informants, the impact of the disadvantages was limited more to minor annoyances than "show stoppers." The overarching conviction was that the matrix structure is indeed the fundamental reason for the success and the proper management of their project-oriented organizations. They did admit, however, that they and their colleagues are challenged daily by some problematic areas often associated with the matrix structure such as:

- Who makes decisions?
- Who evaluates performance?
- Who assigns work?
- Where do loyalties lie?
- How are expertise and career development managed?
- How are time and resources allocated?
- How is conflict managed?
- How is power balanced?

The literature did not suggest any particular solutions for resolving these issues. The dialogue between the researcher and the interviewees did not suggest that any of these issues had simple solutions, but that incremental improvements are continuously being made. Program managers reported that project progress will not be adversely affected by these issues as long as the entire organization (especially the program managers and the functionalists) maintain a balance and share the common vision.

B.   SUMMARY OF "BEST PRACTICES"

This thesis attempted to look outward at organizations that were excelling under the matrix management structure to identify their implementation best-practices. The analysis showed that those organizations were indeed enjoying the benefits of the structure, but were also constantly challenged by the matrix structure's downside. With this reality in mind, the researcher perused methods that could assist

organizations with optimizing a successful transition to the matrix format. The following recommendations were drawn from this analysis:

1.   Human Realm

- Cultivate a common vision and empower employees to fulfill it.

- Train teams as a unit.

- Structure an incentive program that is tied to team accomplishment.

- Develop and cultivate matrix managers' negotiation skills.

- Train all members in conflict management before conflict sets in.

- Do not inhibit conflict, but do keep it constructive and under control.

- Structure meetings; keep them logical and decisive

- Assign together people with comparable skill levels to encourage mutual trust.

- Co-locate wherever possible (if resources do not support co-location, rotation of members may be an viable alternative)

2.   Quality Service

- Design and manage the organization around customers' needs.

- Identify customer requirements, then measure organizational performance accordingly.

- Surpass customers' expectations when the marginal benefit exceeds the marginal costs.

3.   Change Management

- Disseminate regular reports on the intention, status and scope of the change.

- Maintain open two-way communication with all stakeholders.

- Allow ample time for the personnel to adjust to changes.

- Actively pursue participation from front-line people. Put a visible system in place to encourage input and provide feedback to that input.

C. RECOMMENDATIONS FOR FUTURE RESEARCH

1. Feasibility Study of Benchmarking

Benchmarking is an important tool for use in attaining total quality within an organization. Many organizations are adopting it, and its strategic values are repeatedly validated through its reported positive impacts on organizations. Like any good tool, a properly implemented benchmarking program can yield very satisfying outcomes in improving quality and meeting other broad strategic goals. Improperly used, it can be more damaging and wasteful than simply continuing to carry on the activities that initially spawned the benchmarking project. Therefore, the researcher suggests further research into the feasibility of adopting benchmarking as a quality tool at the Military Sealift Command. This study could possibly prioritize the practices and processes to be benchmarked within the organization, thus allowing MSC to optimize its use of the costly tool.

2. Comparison Study of the Benchmarking Membership Organizations

This study could lay the ground work for an organization that has decided to utilize the benchmarking approach. As mentioned in the literature review, membership in organizations like the International Benchmarking Clearing House (IBC) or The Benchmarking Exchange (TBE) can exceed $18,000. Without these services, the cost of aggregating global best-practices would be insurmountable for organizations with limited resources. Perhaps a future researcher could identify other

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organizations similar the IBC and TBE, review the services they provide, and conduct a cost benefit analysis of becoming (paying) members.

3. Study to Determine the Most Effective Organizational Structure for Addressing Specific Issues

Perhaps an evolution of the matrix structure could better deal with some of the issues (such as who makes decisions, who evaluates performance, who assigns work, etc.) confronting program managers. A comprehensive study that determines how each of these issues effects the organization, and how successful organizations are resolving them may lead to the next generation of matrix management.

4. Research the Development of Metrics for the Matrix Structure

None of the informants in this study had metrics that could definitively determine the level of success of their matrix structures. Research that focused on developing these metrics would be useful and broadly applicable, especially for organizations recently adopting matrix structures. New or marginally successful matrix organizations could better determine and fill the performance gaps between them and the highly successful organizations.

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